Sample Paper – 2011
Class – XII
Subject – Physics (Theory)

Roll No.
रोल नं.

Maximum marks: 70

General Instructions:

(i) All questions are compulsory.
*(ii) Question numbers **1** to **8** are very short answer type questions, carrying **one** mark each.*
*(iii) Question numbers **9** to **18** are short answer type questions, carrying **two** marks each.*
*(iv) Question numbers **19** to **27** are also short answer questions, carrying **three** marks each.*
*(v) Question numbers **28** to **30** are long answer type questions, carrying **five** marks each.*
(vi) Use of calculators is not permitted. However, you may use log tables, if necessary.

Q1. Draw an equipotential surface in a uniform electric field.

Q2. If a wire is stretched to double its original length without loss of mass, how will the resistivity of the wire be influenced?

Q3. Why do magnetic lines of force prefer to pass through iron than through air?

Q4. What is the power factor of an LCR series circuit at resonance?

Q5. Why is the transmission of signals using ground waves restricted to frequencies upto 1500KHz?

Q6. The polarizing angle of a medium is 60degrees.What is the refractive index of the medium?

Q7. How does the collector current change in a junction transistor, if the base region has larger width?

Q8. Draw block diagram of a receiver.

Q9. An electric flux of -6 x 10^3 Nm^2/C passes normally through a spherical Gaussian surface of radius 10cm, due to a point charge placed at the centre. What is the charge enclosed by the Gaussian surface?
(ii) If the radius of the surface is doubled, how much flux would pass through the surface?

Q10. Three identical resistors, each of resistance R, when connected in series with a d.c. source, dissipate power X. If the resistors are connected in parallel to the same d.c. source, how much power will be dissipated?

Q11. Define Quality factor. Why should it have a high value for receiver circuits in radio?

Q12. By what percentage would the range of an antenna increase if its length is increased by 21%

Q13. A converging lens has a focal length 20cm in air. It is made of a material of refractive index 1.6 .It is immersed in a liquid of refractive index 1.3, what will be its new focal length? Draw the corresponding ray diagram.

Q14. The half-life of a radioactive sample is 30 seconds. Calculate (i) the decay constant, and (ii) time taken for the sample to decay to 3/4th of its initial value.

Q15. An electron is moving at 10^6 m/s in a direction parallel to a current of 5 A, flowing through an infinitely long straight wire, separated by a perpendicular distance of 10cm in air. Calculate the magnitude of the force experienced by the electron. What is the direction of this force?

Q16. Draw a logic circuit diagram showing how a NAND gate can be converted into a NOT gate.

Q17. What is an zener diode? As compared to a normal diode are the following higher or lower in the zener diode?
(a) Doping
(b) Depletion width
(c) Potential barrier.

Q18. A ray of light while travelling from a denser to a rarer medium undergoes total internal reflection. Derive the expression for the critical angle in terms of the speed of light in the respective medium.

Q19. Explain with the help of a circuit diagram, the use of potentiometer for the determination of internal resistance of a primary cell. Derive the necessary mathematical expression.

Q20. Derive an expression for the equivalent emf and internal resistance of a parallel combination of 2 primary cells. Under what condition is the potential difference across a cell equal to its emf?

Q21. Explain the 3 common defects of vision and show using a ray diagram how they can be corrected.

Q22. The following are the observations regarding an unknown beam "X". What does each signify?
(a) "X" shows interference and diffraction (b) It travels in vacuum with the speed of $3x10^8$m/s
(c) It does not get deflected on passing through an electric field
(d) After passing through a nicol prism, the intensity is reduced.

Q23. A bar magnet, held horizontally, is set into angular oscillations in Earth magnetic field. It has time periods T1 and T2 at two places, where the angles of dip are θ1 and θ2 respectively. Deduce an expression

for the ratio of the resultant magnetic fields at the two places.

Q24. State Huygen's postulates and verify Snell's law of refraction using wave theory.

Q25. State Gauss theorem. Using it derive an expression for the electric field due to a charged spherical shell. Plot E versus R and V versus R.

Q26. Describe briefly with the help of a labeled diagram, the working of a step up transformer. Since the transformer increase the voltage, does it violate the principle of conservation of energy?
(b) Derive a relation between peak value and rms value of ac

Q27.Explain, with the help of a circuit diagram, why the output voltage is out of phase with the input voltage in a common emitter transistor amplifier. Also explain why the active region is preferred for the amplifier.

Q.28> What is modulation. Mention 2 differences b/w AM and FA and draw waveforms to show the difference b/w AM and FM. Give 3 reasons to show that modulation is necessary. Derive an expression for the frequency of side bands and show them graphically.

Q.29> Derive a relation between object and image distance when refraction of light takes place at a convex refracting surface. Mention the assumptions used. Using this result, derive the lens maker formula.

Q30.> How is a Zener diode fabricated to make it a special purpose diode. Draw I-V characteristics and explain the significance of the the breakdown voltage
(b) Explain with the help of a circuit diagram, the working of a half wave rectifier.

For solutions
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